Klamath National Forest

Best Management Practices

REGION 5

EVALUATION PROGRAM

WATER QUALITY

MONITORING REPORT

2012 Fiscal Year

Evaluation of Forest Service administered projects including timber sales, roads, grazing, recreation sites, fuels reduction, in-channel construction and road decommissioning.

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Contents

KLAMATH NATIONAL FOREST

2012

BEST MANAGEMENT PRACTICES (BMP)

Summary

Fiscal year 2012 was the twenty-first year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest (Forest) and the Forest Service Pacific Southwest Region (Region). This program is designed to evaluate how well the Forest and the Region implement BMPs and how effectively the BMPs control water pollution from National Forest lands. Onsite evaluations have been divided into 29 possible "activity groups" (categories) that look at related management practices. In the 2012 fiscal year, Klamath National Forest staff evaluated timber, engineering, range, recreation, minerals, and restoration projects to determine whether BMPs were implemented and effective. Twenty-two different protocols were used to evaluate a total of sixty-one sites. Each protocol is designed to measure implementation and effectiveness of an activity category that includes from one to six related BMPs. Appendix A is a table that cross-walks each protocol/activity category alpha-numeric code with its name and the BMPs it is designed to monitor.

The Forest's BMPEP is composed of two sampling strategies. The first is the evaluation of randomly sampled sites, where data are collected and entered into a Regional database. The second strategy is non-random monitoring, in which sites are selected based on management interest in specific ongoing projects. These sites are often evaluated concurrently ("real time") and can be qualitative as well as quantitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment; however, the in-channel construction protocol requires at least one sample per site to be done during the active project phase. The site evaluations followed protocols described in Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide (USDA, Forest Service, 2002). The random samples were selected from a pool of eligible sites. In cases where the sample pool is very small, either all eligible sites are evaluated, or selection is done in a way that does not bias which sites are selected. The results of the random and non-random evaluations are summarized here.

Randomly sampled sites: In 2012, 61 sites were randomly drawn and evaluated from Forest activity pools and each was reviewed for BMP implementation and effectiveness. Timber (17 sites), prescribed fire and fuels (7 sites), road and engineering (27 sites), recreation (4 sites), grazing (4 sites), and mining operations (2 sites) activities were evaluated. Sites were located on all Ranger Districts (Oak Knoll, Happy Camp, Salmon River, Scott River, and Goosenest).

BMP Implementation was evaluated to determine whether: (1) we did what we said we were going to do to protect water quality; and (2) project environmental documentation and/or contract/permit language was sufficient to ensure water quality protection. BMP effectiveness was evaluated to determine if water quality protection measures met objectives. The objective for meeting most

evaluation criteria is keeping all sediment out of channels and near-channel areas. Sediment deposition presence, volume and proximity to the nearest watercourse were used to indicate level of effectiveness.

In 2012 BMPs were fully implemented at 92% of the sites evaluated and fully effective at 87% of the sites evaluated. Five percent of the implementation evaluations fell into the "minor departure" category and three percent failed implementation. Eight percent of the effectiveness ratings fell into the "at-risk" category and five percent failed effectiveness. Table 1 summarizes the results of the BMP Random Site Evaluation Program for 1992 through 2012.

Table 1. BMP Random Site Evaluation Program from 1992 through 2012

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		% Rated Minor departure*	% Rated Fully Successful	% Rated At-risk*	% Rated Fully Successful
1992	53	N/A	55%	N/A	81%
1993	77	N/A	79%	N/A	94%
1994	52	N/A	75%	N/A	89%
1995	77	N/A	83%	N/A	96%
1996	57	N/A	84%	N/A	98%
1997	60	N/A	100%	N/A	98%
1998	54	N/A	65%	N/A	98%
1999	38	N/A	66%	N/A	89%
2000	45	N/A	89%	N/A	96%
2001	64	N/A	88%	N/A	95%
2002	53	N/A	92%	N/A	96%
2003	51	N/A	80%	N/A	90%
2004	53	N/A	94%	N/A	100%

Table 1 Cont'd. BMP Random Site Evaluation Program from 1992 through 2012

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		% Rated Minor departure*	% Rated Fully Successful	% Rated At-risk*	% Rated Fully Successful
2005	48	N/A	96%	N/A	98%
2006	45	N/A	93%	N/A	100%
2007	57	N/A	98%	N/A	96%
2008	50	N/A	78%	N/A	92%
2009	63	N/A	97%	N/A	98%
2010	59	0%	100%	5%	88%
2011	60	7%	85%	3%	92%
2012	61	5%	92%	8%	87%

*2010 was the first year the "Minor departure" and "At-risk" categories were added

2012 BMP MONITORING REPORT

Introduction

On-site evaluations are the core of the BMP Evaluation Program. Such evaluations are necessary to meet the requirements of a Management Agency Agreement between the Region and the State of California. There are 29 different evaluation procedures designed to assess a specific practice or set of closely related practices. Though the evaluation criteria vary based on the management activity, the evaluation process is similar amongst activities. The Regional Office annually assigns the type and number of management activities to be evaluated on each Forest. The specific sites for each evaluated management activity are randomly selected from Forest project pools. When BMP failures occur, corrective actions are taken and documented. Statistical analyses are periodically performed from the collective Regional data, and annual reports of Region wide BMP implementation and effectiveness are presented to the State and Regional water boards. The criteria for sample pool development are regionally standardized by activity type and described in the BMPEP User's Guide (2002).

Follow-up monitoring is also conducted for any sites that were not rated as fully effective the previous year. This monitoring evaluates the success of corrective actions that were implemented the previous year.

In addition to the random sample sites and follow-up monitoring, projects are selected that are of management interest with regard to timely water quality protection implementation. Evaluation of non-randomly selected sites can be accomplished while the project is actively operating and is often called "concurrent" BMP monitoring. Feedback is immediate and remedial action can be taken. However, comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter season to test the protection measures. In addition to the BMPEP, contract compliance monitoring is done concurrently, and assesses BMP implementation along with other project resource protection measures.

BMP monitoring strives for an interdisciplinary evaluation of projects and actively involves project proponents and watershed personnel. This interdisciplinary effort provides direct feedback to the project proponent on how well the BMP was implemented and allows for adaptive management on future project designs. Earth scientists Joe Blanchard and Verna Yin, range conservationist Stephanie McMorris, and District project leaders conducted the 2012 BMP evaluations.

Methods

Data collection methods are specific for each BMP activity group and are described in the BMPEP User's Guide (USDA, Forest Service, 2002). Data gathered for each BMP are used to answer specific questions on BMP evaluation forms. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) to be evaluated must: 1) be implemented under a NEPA decision; 2) adhere to contract requirements; and 3) have been completed at least one but not more than 3 winters prior to evaluation. In-channel construction BMP evaluations (E-13) are conducted during the activity and immediately after completion.

The timber, silvicultural, and engineering project sample pools were developed from a list of timber sales, vegetation management, and storm-proofing projects completed the previous year. Decommissioned road samples were taken from the Forest-wide Decommissioned Roads Database. The prescribed fire sample pool was developed from a list of completed prescribed fire projects. The recreation sample pool included all known developed and dispersed recreation sites on the Forest. The grazing sample pool was a list of active grazing allotments on the Forest.

Randomly Sampled Site Results

Sixty-one sites were sampled from within 27 6th field watersheds on the Forest (Table 2). The following is a breakdown of the type of activities sampled on timber, engineering, range, recreation, minerals, grazing, and restoration projects:

Table 2. Summary of 2012 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Sites

Form	Project/Site	Implementation	Effectiveness	6th Field Watershed
T01	Beauty Flat Unit 92	Pass	Pass	Boulder Creek-Scott River
T01	Beauty Flat Unit 93	Pass	Pass	Boulder Creek-Scott River
T01	Tennessee Thin Unit 62	Pass	Pass	Indian Creek
T01	Loop Thin Unit 1	Pass	Pass	Main East Fork South Fork Salmon River
T02	Beauty Flat Unit 94	Pass	Pass	Tompkins Creek-Scott River
T02	Jack Conventional Unit 64	Pass	Pass	South Fork Scott River
T02	Tennessee Thin Unit 11A	Pass	Not Effective	Indian Creek
T02	Tennessee Thin Unit 62	Pass	Pass	Indian Creek
T03	Panther Unit 110	Pass	Pass	Lower Elk Creek
T03	Jack Conventional Unit 21	Pass	Pass	French Creek
T04	Beauty Flat Unit 94	Pass	Pass	Tompkins Creek-Scott River
T04	Jack Conventional Unit 64	Pass	Pass	South Fork Scott River
T04	Horse Heli Unit 34	Pass	Pass	Horse Creek
T04	Tennessee Thin Unit 62	Pass	Pass	Indian Creek
T05	Trolley Stewardship	Pass	Pass	Grass Lake
T05	Mt Ashland Stewardship	Pass	Pass	Cow Creek- Grouse Creek
T07	Beauty Flat Unit 93	Pass	Pass	Boulder Creek-Scott River
E08	Mill-Luther Phase 1- 17N56	Pass	Pass	Lower Indian Creek
E08	Mill-Luther Phase 3- 18N22	Pass	Pass	Upper Indian Creek
E08	Mill-Luther Phase 3- 18N31	Minor Departure	At Risk	Upper Indian Creek
E08	Last Canyon 44N45A	Pass	Pass	Canyon Creek
E09	Mill-Luther Phase 1- 17N56	Pass	Pass	Lower Indian Creek
E09	Mill-Luther Phase 3- 18N22	Pass	Pass	Upper Indian Creek

Table 2 Cont'd. Summary of 2012 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Site

Form	Project/Site	Implementation	Effectiveness	6th Field Watershed
E09	Mill-Luther Phase 3- 18N31	Pass	Pass	Upper Indian Creek
E09	Last Canyon 44N45A	Not Implemented	Not Effective	Canyon Creek
E10	Mill- Luther Phase 1- 17N12C	Pass	Pass	Lower Indian Creek
E10	Mill- Luther Phase 3- 18N16C	Pass	Pass	East Fork Indian Creek
E11	Mill- Luther Phase 1- 17N12C	Pass	Pass	Lower Indian Creek
E11	Mill-Luther Phase 3- 18N22	Pass	Pass	Upper Indian Creek
E11	Mill-Luther Phase 3- 18N31	Pass	Pass	Upper Indian Creek
E11	Last Canyon 44N45A	Pass	Pass	Canyon Creek
E13	Mill-Luther Phase 3- 18N32 M.P. 0.52	Not Implemented	At Risk	Upper Indian Creek
E13	Mill-Luther Phase 3- 18N32 M.P. 1.73	Pass	Pass	Upper Indian Creek
E13	Last Canyon 43N19 M.P. 1.23	Pass	Pass	Canyon Creek
E13	Last Canyon 43N19 M.P. 1.48	Pass	Pass	Canyon Creek
E14	Orca Unit 1	Pass	Pass	Upper Butte Creek
E14	Beauty Flat Unit 98C	Pass	Pass	Boulder Creek-Scott River
E14	Jack Conventional Unit 21	Pass	Pass	French Creek
E16	Panther Stanza Creek	Pass	Pass	Lower Elk Creek
E16	Jack Conventional Little Jackson Creek	Pass	Pass	South Fork Scott River
E17	37N14 China Cr crossing	Pass	Pass	Garden Gulch-South Fork Salmon River
E17	40N33 Sur Cree Cr crossing	Pass	Pass	Little North Fork Salmon River
E17	40N33 Cherry Cr crossing	Pass	Pass	Little North Fork Salmon River
E20	Lookout Timber Sale RD 44N01	Pass	Pass	Willow Creek
R22	Trail Creek Campground	Pass	Pass	Main East Fork South Fork Salmon River
R22	Indian Creek River Access	Pass	At Risk	Oak Flat Creek-Klamath River

Table 2 Cont'd. Summary of 2012 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location for Randomly Sampled Site

Form	Project/Site	Implementation	Effectiveness	6th Field Watershed
R30	Gold Flat River Access	Pass	Pass	Scott Bar-Scott River
R30	Carter Meadows Dispersed Camps	Pass	Pass	Main East Fork South Fork Salmon River
G24	Lake Mtn	Pass	Not Effective	Bittenbender Creek-Klamath River
G24	Horse Creek	Pass	Pass	Horse Creek
G24	Grouse Creek	Minor Departure	At Risk	Picayune Creek-Trinity River
G24	Big Ridge	Pass	At Risk	Kelsey Creek
F25	Cade HC FPCT Broadcast Burn Unit 26	Pass	Pass	China Creek- Klamath River
F25	Happy Camp FPCT Underburn unit 37	Pass	Pass	China Creek- Klamath River
F25	Happy Camp FPCT Underburn unit 32	Pass	Pass	China Creek- Klamath River
F25	Deep Creek underburn	Pass	Pass	Tompkins Creek-Scott River
F25	LSR Jackpot Burn unit 6	Minor Departure	Pass	Meiss Lake
M26	BS&M Placer Mine	Pass	Pass	Humbug Creek
M27	Dry Lake Gravel Pit	Pass	Pass	Blue Canyon- Dry Lake
V28	Humbug Greenhorn Unit 136-922	Pass	Pass	Humbug Creek
V28	Humbug Greenhorn Unit 136-913	Pass	Pass	Humbug Creek

Discussion of Random Sampling Results

Timber Activities

Timber Activities that were sampled fell into the following activity groups:

Streamside Management Zones (T01), Skid Trails (T02), Suspended Yarding (T03), and Landings (T04), Timber Administration (T05), and Meadow Protection (T07). Twenty-one sites were sampled on all five districts. All passed implementation and effectiveness except one skid trail evaluation which failed implementation.

Almost all timber activities were rated as fully implemented and effective with the exception of skid trails in the Tennessee Project. This failure did not significantly impact beneficial uses because sediment was deposited before reaching the SMZ.

T02 Skid Trails

Tennessee Thin Unit 11A. Scott Rover Ranger District. Implemented/ Not Effective

At Tennessee Thin, Unit 11A, most of the skid trails had effective erosion control with properly functioning waterbars. However gully erosion and an ineffective waterbar was noted below FS road 45N59. Water had been diverted onto the skid trail, which had overwhelmed the waterbar, causing it to fail (Photo 1).It was discovered that water had been diverted upslope where a skid trail had crossed a swale. Material left in the swale as a result of skidding had blocked the natural flow path during an intense rain event causing water to divert out of the swale and onto the adjacent hillslope. The diverted water eventually returned to the natural channel about 100ft below road 45N59.

The Timber Sale Administrator (TSA) and Scott River Ranger District timber staff were notified of the problem. On July 23rd, 2012 a compact utility loader was used to remove material from the swale to return the natural flow path back into the channel and repair failed water bars. Slash was used to cover exposed soil to reduce surface erosion. The swale did not have any evidence of scour and was not identified on the Sale Area Map as a Streamside Management Zone (SMZ), so it was difficult for the TSA to anticipate that erosion could have been an issue at this site. To prevent this from occurring in future projects, special attention should be paid to potential drainage issues where skid trails cross swales. If a skid trail disturbs the natural flow path in a swale, it should be corrected before erosion control features are accepted by the TSA.

Photo 1. Gully erosion and a failed waterbar on a skid trail in Tennessee Thin, Unit 11A

Photo 2. Material left in a swale upstream of the failed waterbar had diverted water onto the hillslope

Photo 3. Scott/Salmon River Ranger District staff removing material from the swale to redirect flow back into the channel

Photo 4. The result of clearing material from the swale to divert water back into the channel. Slash was then placed over disturbed soil.

Road and Engineering Activities

The following activity groups were sampled: Road surfacing, drainage and protection (E08), Stream Crossings (E09), Road Decommissioning (E10), Control of Side cast Materials (E11), In-channel Construction Practices (E13), Temporary Roads (E14), Snow Removal (E17), Water Source Development (E16), and Protection of Roads (E20). A total of 27 engineering sites were evaluated on four districts with implementation rated as fully successful and fully effective at 89% of the sites. Four percent of the implementation ratings fell into the "minor departure" category and 7% failed implementation. Seven percent of the effectiveness ratings fell into the "at-risk" category and 4% failed effectiveness.

Most Engineering evaluations passed implementation and effectiveness; however deficiencies were noted in Road surfacing, drainage and protection (E08), Stream Crossings (E09), and In-channel Construction Practices (E13). Failures caused minor and short term impacts to beneficial uses by delivering small amounts of sediment to intermittent stream channels.

E08 Road Surface, Drainage and Slope Protection

Mill-Luther Phase 3-18N31. Minor Departure/ At Risk. Happy Camp Ranger District. Minor problems with BMP implementation and effectiveness were noticed at three rolling dips. At one rolling dip, rip rap was not placed correctly and water drained around the rip rap instead of draining through it (Photo 5). At other locations, the gravel placed in the rolling dip did not prevent rilling (Photo 6). The project plans called for ¾ in. minus gravel to be placed over rolling dips. This size aggregate did not stand up to the flow over some of these rolling dips. Compounding the issue at this site is that concentrated water from spur roads upslope of 18N31 has increased flow over the rolling dips. These spurs are used to access a power line and are maintained by the power company under a special use agreement.

Watershed staff and engineering will review the site in 2013 to determine if larger aggregate should be brought it to better armor the dips. Additionally, the group will evaluate the spur roads that access the power line to determine if waterbars are needed to dissipate surface flow before reaching rolling dips.

Photo 5. Rip Rap was not placed correctly to filter runoff from rolling dip

Photo 6. Rill erosion of gravel placed on a rolling dip

E09 Stream Crossings

Last Canyon- 44N45A. Scott River Ranger District. Not Implemented/ Not Effective. Work on this project had been partially completed in the fall of 2011. A storm in the winter of 2012 resulted in gullying at this site, before all of the aggregate had been brought in and compacted (Photo 7). The gullying was brought to the attention of the project engineer and corrective action was taken by placing more aggregate on the rolling dip and compacting the road surface (Photo 8). With these corrective actions and the re-establishment of vegetation on the cut slopes, this site is expected to pass BMP effectiveness when watershed staff re-visits the site in 2013.

Photo 7. Gully erosion on a rolling dip

Photo 8. Corrective action taken to fix the gullying on the rolling dip

E13 In-Channel Construction Practices

Mill-Luther Phase 3- 18N32 M.P. 0.52. Happy Camp Ranger District. Not Implemented/ At risk. Project plans called for removing an existing culvert, reducing the fill in the crossing, and installing a new culvert. The project plans had been carried out to specifications, with the exception of removing the old culvert (Photo 9). At the time when work was being done, water was still flowing through the old culvert, so it was left in place and the new culvert was installed adjacent to it. A large volume of material still remains in the fill, but the risk of crossing failure was reduced by increasing the capacity with a new larger culvert and by installing a critical dip over the fill. At the time of the evaluation, water was heard running under the old culvert, which could undermine the fill. Watershed specialists and engineering staff will re-visit this site in 2013 to evaluate the risk failure at this crossing and determine if additional work needs to be done.

Photo 9. In-channel construction Photo after new culvert was installed. The new culvert is on the left and an old culvert is slightly below grade on the right.

Recreation Activities

Two activity groups were evaluated: Developed Recreation (R22) and Dispersed Recreation (R30). A total of four sites were sampled on three districts. Three recreation sites were evaluated as implemented and effective, one recreation site was rated as implemented and at risk.

Minor BMP issues were noted at two of the recreation sites evaluated in 2012. The developed Trail Creek Campground had a culvert that needed to be cleaned out and an inboard ditch pulled. The Indian

Creek River Access had some minor rilling in the parking lot and should be monitored closely due to its proximity to the channel. Beneficial uses were not impacted by either of these BMP problems.

R22 Developed Recreation Sites

Trail Creek Campground. Salmon River Ranger District. Implemented/ Effective. Monitoring at this sight found some drainage structures including a culvert and ditch that need to be cleaned out. District recreation staff returned with a small excavator soon after to perform the recommended maintenance.

Photo 10 a and b. Culvert at the Trail Creek Campground before (left) and after (right) cleaning.

Indian Creek River Access. Happy Camp ranger District. Implemented/ At Risk. Monitoring found runoff from the parking lot for Indian Creek River Access deposited on a small flat between the parking lot and the creek. Due to the close proximity of the parking lot to the creek, the erosion from the parking lot should be closely monitored and to determine if improvements should be made such as adding new gravel or installing a sediment filter or barrier to prevent sediment from reaching the creek during an intense rain event. The issue was discussed with the District Recreation Officer and options to install additional gravel at the parking area being considered.

Photo 11. Sediment from the Indian Creek River Access parking lot deposited on a flat with the SMZ

Grazing

One Activity Group, Range Management (G24) was evaluated at four separate range allotments on two districts. Three range allotments were rated as fully implemented and one had minor departures in implementation. One range allotment was rated as fully effective, two were rated at risk, and one was rated a not effective.

Concurrently to these evaluations, the draft national BMP protocols were field tested at the same locations.

G24-Range Management

Two allotments on the Oak Knoll district and two allotments on the Scott River District were chosen for BMPEP sampling during the 2012 season. Evaluations were made near long term transects, or key areas. Standards and Guidelines for herbaceous utilization and streambank disturbance (when applicable) were met at all sites. One location did not meet woody utilization standards. Table 3 gives the effectiveness rating for each sample site for streambank stability, according to the BMPEP form. The

deficiencies in BMP effectiveness resulted in insignificant to minor impacts of beneficial uses of water. Results from BMP monitoring were used to make corrective actions through changes to Annual Operating Instructions (AOI) for 2013 or will be used to guide actions analyzed through an upcoming range NEPA analysis in 2013. Follow-up monitoring will be conducted to determine if corrective actions were successful.

Big Ridge Allotment, Turk Lake Unit. Scott River Ranger District. Implemented/ At Risk

The site evaluated drains Turk Lake and is a downcut rocky channel interspersed with riparian shrubs. The downcutting was probably caused by historic grazing practices in conjunction with natural flooding and high spring flows. The creek appears to be stabilizing as evidenced by the growth of riparian shrubs and herbaceous vegetation in the bottom of the channel. The stream is shaded both by streamside shrubs and trees. The walls of the banks are not well vegetated and have very loose soil; therefore leaving the site vulnerable to erosion. Other factors contributing to streambank instability and erosion include one major cattle crossing and gopher activity. Implementation standards and guidelines for herbaceous utilization, woody utilization and stream bank alteration were met fully; grazing was light to moderate. Effectiveness criteria were in the highest category other than the streambank stability (less than 70% stable) and floodplain erosion categories. No changes in grazing management are recommended for this unit at this time, but the Multiple Indicator Monitoring Plot established here should be reread by the year 2015 to establish trend for this site and determine if further actions are warranted. The impacts of historic grazing practices in this allotment have contributed to minor impacts on beneficial uses due to increased sedimentation. The allotment seems to be on an improving trend towards greater streambank stability but follow-up monitoring will be required to confirm this trend.

Photo 12. Big Ridge Allotment, Turk Lake Unit. Stream channel shows <70% bank stability.

Grouse Creek Allotment, Masterson Meadow Unit. Scott River Ranger District. Minor Departure/ At Risk

The site that was evaluated is within a sloped moist meadow which is centrally drained by a small creek. The reach is lined with a diverse community of sedges, grasses, and forbs. Very few woody species are present within the meadow. The streambanks were mostly covered by deep rooted vegetation with little evidence of erosion. Some localized trampling was observed which may put the creek at risk for widening. Implementation standards and guidelines were met for herbaceous utilization but woody alteration was within 80% of the standard. Effectiveness criteria were in the highest category other than streambank stability which was less than 70% stable. Due to the fact woody utilization did not meet standards; the permittee was called to remove cattle from the unit and the AOI for 2013 will be changed. It was also recommended that a Multiple Indicator Monitoring Plot be established in the evaluated reach to determine condition and trend of the creek. No trend could be deduced for streambank stability because prior data wasn't available however; the area did not receive cattle use during the 2010-2011 seasons which may suggest factors other than livestock management are contributing to the bank instability. Streambank instability from trampling resulted in very little effects to beneficial uses, but the creek is at risk for widening in the future if corrective actions were not taken. Follow-up monitoring will be necessary to see if corrective actions have resulted in an improved trend in streambank stability.

Photo 13. Grouse Creek Allotment, Masterson Meadow Unit. Stream channel shows <70% bank stability.

Horse Creek Allotment, Lower Horse Creek Unit. Oak Knoll Ranger District. Implemented/ Effective

The site evaluated is a shallow, wide portion of Horse Creek that is located in the spring range unit. This site is not near a typical meadow key area like the other evaluated sites, but is important to monitor because it is near transitory range and is one of the few cattle-accessible anadromous areas of the creek. The plant community type consists of Douglas Fir, Bigleaf Maple, Western Raspberry, and California Hazel which provides complete shade for the creek. The creek is fairly close to a main road, however, streambank stability is high (82%) due to the rocky streambed and the deep rooted plant community. There were no observances of cattle caused alteration to the streambanks. Implementation standards and guidelines were met and all effectiveness criteria were in the highest category.

Photo 14. Horse Creek Allotment, Lower Horse Creek Unit. No observable grazing impacts on streambank.

Lake Mountain Allotment, Kuntz Creek Unit. Oak Knoll Ranger District. Implemented/ Not Effective.

The area evaluated was a spring site which was developed prior to 1940. It is frequented often by cattle due to the fact that it is the only water source on the ridge of a large meadow complex. The site evaluated is small (less than ½ acre) and contains a small pond surrounded by a wet meadow dominated by sedges. No woody shrubs were present at the site. Lentic Habitat was the only effectiveness section

evaluated for cattle impacts because Kuntz Creek is steep and armored by a large patch of alder. Monitoring results indicated that hoof prints affect more than 10% of the spring area and may be impacting soil saturation, however the herbaceous vegetation appeared to be maintaining vigor and was mostly composed of mid to late seral species. Implementation standards and guidelines were met. This allotment will be undergoing NEPA analysis next year and it was recommended that options for fencing the spring and placing a trough outside the meadow be examined. The impacts to the trampling in the spring area did not impact downstream beneficial uses of water. Sediment and temperature on Kuntz Creek were not impacted because the spring and pond are not connected to the creek. Kuntz Creek is protected from disturbance because it is well armored by alders and fairly steep, making it inaccessible to livestock.

Photo 15. Lake Mountain Allotment, Kuntz Creek Unit. Hoof prints have impacted >10% of the wet meadow.

Table 3. Summary of Bank Stability Ratings for Range Management Samples

Allotment and District	Pasture Unit	Bank Stability Rating from G24 Form		
		>80%	70-80%	<70%
Big Ridge, Scott River	Turk Lake			X
Grouse Creek, Scott River	Masterson Meadow			X
Horse Creek, Oak Knoll	Lower Horse Creek	X		
Lake Mountain, Oak Knoll	Kuntz Creek	NA*		

*Bank stability is not applicable to this site because only the lentic habitat was evaluated

Fire and Fuels Activities

Prescribed Fire (F25) and Vegetation Management (V28) were evaluated at seven sites on three districts. All were rated as fully successful for implementation and effectiveness, except for the LSR Jackpot Prescribed burn that had a minor departure in implementation.

LSR Jackpot Burn unit 6, Goosenest Ranger District. Minor Departure/ Effective

The NEPA document that covers the LSR Jackpot Burn specifically restricted under-burning in inner-gorges and unstable areas in Unit 6 due to erosion concerns. These restrictions were not carried forward in the Burn Plan for this project; nowhere in the burn plan were inner-gorges or unstable areas mentioned. Upon a field review of this unit, most of the inner-gorges were either burned very lightly or not at all due to the fact that fuels in these areas were very sparse. Ground cover in these inner gorges is sufficient to prevent sheet or rill erosion into intermittent drainages.

Photo 16. Jackpot LSR Unit 6 with very light under-burn in inner-gorge

Mining

Mining Operations (M26) and Common Variety Minerals (M27) were evaluated were evaluated at two sites on two districts. Both rated as fully implemented and effective.

Summary of Non-Random Sampling Evaluations

Non-Randomly Sampled Site ("Concurrent") Monitoring

Data collection was similar to that used for randomly sampled sites; however, some data may be more qualitative than those collected using the strict Regional protocol. Often the same forms are used. Data are stored in a Forest database but are not entered into the regional database or numerically scored. Narrative reports often present or supplement the evaluation.

Several sites were selected for concurrent monitoring because the activities and their proximity to watercourses pose a potentially high risk for sediment discharge.

Thom Seider Project monitoring

On December 4th 2012, watershed specialists and a timber sale administrator reviewed landings used for the Thom Seider Project. Two landings along FS road 48N20 were evaluated for rilling or concentrated flow on the landing surface and sediment delivery to Seaid Creek. Rilling and concentrated flow was evident on the landing and sediment was delivered to the inboard ditch adjacent to the landing. A new culvert that was installed to drain the inboard ditch prevented sediment from being delivered to Seaid Creek. The reason for erosion problems on the landing surface was two-fold; soil cover on the landings had been consumed in the 2012 Goff Fire leaving the landing vulnerable to erosion, and equipment used in the Goff BAER storm-proofing project had driven on the landing as a turn-around which concentrated flow down tire ruts and into the inboard ditch. Corrective action was taken by using logs to block vehicle traffic onto the landing and cover the landing with weed-free straw to prevent further surface erosion.

Picture 17 a and b. Thom Seider landing before corrective action on the left and after corrective action on the right

Goff BAER storm proofing Monitoring

On December 5th 2012 watershed specialists reviewed in-channel construction BMPs on the Goff Fire Burned Area Emergency Response (BAER) Project. The project was designed to storm proof FS road 48N20 before the onset of the wet weather season to prevent damage to infrastructure and Coho salmon habitat. The work was completed right before a major rain event so the watershed group took the opportunity to evaluate the success of the treatments and to see if BMPs were properly implemented and effective. Two of the largest culvert upgrade sites were evaluated for sedimentation of channel riffle substrate, turbidity, disturbance to the channel, fill in channel, and fill on the floodplain. There was no discernible difference in riffle substrate above or below the culvert, nor was there a turbidity plume from construction activities. Fill from construction activities was not evident in the channel or on the floodplain. Though disturbance to the active channel was minimized, the slopes adjacent to the channel were disturbed and without soil cover. Correct action that was taken to reduce any risk of erosion by seeding and coving the bare slope with weed-free straw.

Photo 18 a and b. In-channel construction evaluation before corrective action on the left and after corrective action on the right

2012 Wet Weather Operations

T05/E20: Selected WWO notes from timber sale administrators have been compiled and attached as Appendix B. These notes evaluated features such as roads, skid trails, water holes, and cable corridors during periods of wet or snowy conditions. Problems leading to BMP failures were identified and corrected. Resource staff was contacted when necessary to determine if BMPs were being met.

Summary of Follow-up Evaluations

Follow-up monitoring was conducted at sites that were not rated as fully effective in 2011. The table below lists the sites with less than fully effective rating in 2011 and corrective actions or recommendations. All sites that were revisited in 2012 for follow-up monitoring passed BMP effectiveness.

Table 4. Summary of follow-up monitoring in 2012

Form	Project/Site	Corrective Actions Taken in 2011	Notes for 2012 Evaluations	2012 Effectiveness
T02	Tea Garden unit 27	Waterbars rebuilt	Check condition of rebuilt waterbars	Pass
E08	Orr Lake Rec. Dev. Project rd. 44N30X	None, natural vegetation of fillslope will occur	Check for rills and failures on fill slope	Pass
E09	Orr Lake Rec. Dev. Project rd. 44N30X	None, natural vegetation of fillslope will occur	Check level of cover on fill slope, as well as rilling and slope failures	Pass
E13	China-Fish Aquatic Passage ARRA rd. 47N77	Debris deposit excavated to original channel width and depth	Check the excavation of debris deposit to see if cleared to original channel depth and width as described. Check downstream for evidence of sedimentation of channel riffle substrate	Pass
E13	China-Fish Aquatic Passage ARRA rd. 46N03	None, no problems with design and construction of stream crossing were noted	Check downstream for evidence of sedimentation of channel riffle substrate	Pass
E14	Tea Garden unit 27	Barrier placed to block road and waterbars built	Check if barrier is effective in keeping trucks off of temp road. Check effectiveness of waterbars	Pass

T02 Skid Trails

Tea Garden unit 27, Salmon River District- Waterbars were installed or repaired by District staff in 2011 after monitoring showed problems with improper design and construction. Results of follow-up monitoring showed that repaired waterbars were properly constructed and that no signs of erosion were detected on the skid trails in the unit.

E08 Road Surface & Slope Protection and E09 Stream Crossings

Orr Lake Rec. Dev. Project rd. 44N30X, Goosenest Ranger District- The fillslope of a road that was relocated away from Orr Lake was not hydro-seeded as specified in the contract and there were minor rills and slope failures. The erosion and slope failures on the fill slope were not at risk of delivering sediment into the lake. It appeared that the slopes had stabilized and needle cast had provided sufficient cover to prevent further erosion. Upon the follow-up site visit it was determined that no new slope failures or erosion had occurred on the fill slope.

Photo 19 a and b. Fill slope stabilizing after failure. Photo on the left was taken in 2011 and the Photo on the right was taken in 2012.

E13 In-channel Construction Practices

China-Fish Aquatic Passage ARRA rd. 47N77, Happy Camp District- The decision memo for Klamath Fish Passage Sites required that the fill material be excavated (approx. 550 ft3) to the depth of the original channel gradient and to the width of the canyon wall and/or floodplain at the base. Post-winter evaluation in 2011 showed that the debris deposit was not excavated to the original channel depth, instead the stream channel had incised with a 6 foot steep eroding bank. Engineers repaired the site in 2011 by excavating the debris deposit and extending the channel width back against the canyon wall. The follow-up evaluation in 2012 showed a stable stream channel that was excavated to the original depth and gradient, and armored with rock and gravel.

Photo 20 a and b. On the left- Photo of incised stream channel upstream of the culvert replacement. On the right-Photo of a stabilized stream channel upstream of the culvert replace after fill material had been removed.

China-Fish Aquatic Passage ARRA rd. 46N03, Oak Knoll District- This project failed effectiveness because sediment from the construction phase of the project was deposited on the substrate downstream of the crossing. In 2012 no discernible difference was detected in the riffle substrate above or below the replace culvert and the site fully passes BMP effectiveness.

E14 Temporary Roads

Tea Garden unit 27, Salmon River District- The temporary road was graded and outsloped after logging operations and before the sale was closed but not blocked or waterbarred as specified in the environmental assessment (EA). The road was then re-opened by the District to allow woodcutter access to the slash pile at the landing. The grantic native surface road was used during wet weather causing rutting on the road, which concentrated flow down its length due to a lack of waterbars. In 2011 District staff was alerted of the BMP failure and corrected the problem by blocking access to the temporary road with a large berm and installing waterbars. The follow-up evaluation in 2012 showed that waterbars were effective in draining the road surface and the berm effectively blocked vehicle traffic onto the temporary road.

Adaptive Management Discussion

Practices That Are Working Well

Most of the activities evaluated in 2012 met BMP compliance and were effective at controlling nonpoint pollution. These included most timber sale activities; minerals management activities, fire and fuels activities, and recreation sites. For activities where Best Management Practices were fully implemented and effective, no modifications are recommend for future projects.

Follow-up monitoring of BMP effectiveness problems that occurred in 2011 has shown that the Forest has been successful in applying corrective action to address water quality protection. All of the sites that were re-visited in 2012 showed 100% effectiveness in their BMP evaluations. This success is a result of district and engineer staff responding to the request to fix sites where water quality issues have been identified as in the case of the Tea Garden Timber Sale and the China-Fish Aquatic Passage Project.

Practices That Can Be Improved

Storm proofing projects, erosion control on skid trails, and range management can be improved through adaptive management and updating NEPA analysis. In all cases where sites were rated as less than full effective, corrective actions were taken if necessary, and follow-up monitoring will occur in 2013. Table 5 lists the evaluations with less than fully effective rating in 2012, corrective actions taken, and notes for 2013 follow-up monitoring.

BMP effectiveness can be improved through adaptive management of design and implementation of storm-proofing projects. Two issues that were encountered in 2012 were a result of using aggregate that did not hold up from the flow over rolling dips. BMP 2.8- Stream Crossing, calls of armoring rolling dips based on soil characteristics and potential risks of eroding fill material. When designing rolling dips in the future, engineers should consider armoring the dips if larger flows are expected. New projects will increase aggregate size from ¾ in minus to 1 ½ in. minus for the road surface. This larger aggregate can stand up to larger flows and should increase the rate of BMP effectiveness for storm-proofing projects.

Consideration of subtle drainage features like swales need to be emphasized when applying or approving waterbars or other erosion control features on skid trails. In the case of the Tennessee Thin Unit, a skid trail crossed a swale that under normal conditions did not carry flow and was not identified on the sale area map as a Streamside Management Zone. An intense rain event combined with impacts of skid trails and thinning resulted increase overland flow that was subsequently diverted out of the swale. Timber Sale Administrators were involved in the monitoring and corrective action for the Tennessee Thin Unit and will apply lessons learned from this evaluation to future timber sales.

Establishing monitoring to determining trends, adaptive management, and updating NEPA for grazing allotments needs to be a continued emphasis for range managers to improve consistency in BMP implementation and effectiveness. For the Big Ridge allotment, Multiple Indicator Monitoring (MIM) was established, which can be re-read in future years to determine trends in streambank stability. In this allotment, all implementation and effectiveness criteria were fully met with the exception of streambank stability. Because it is unclear if the streambank is on an improving or declining trend and grazing is light to moderate, changes in grazing management were not recommended, but future monitoring of this unit will establish a trend for this site and determine if further actions are warranted. Adaptive management was used on the Grouse Creek allotment to address woody utilization that was slightly over standards. Cattle were removed from the unit and the AOI will be changed for 2013. Trampling in the wet meadow at the Lake Mountain allotment will be addressed when NEPA analysis is updated for that allotment beginning in 2013. Follow-up monitoring will occur for Big Ridge, Grouse Creek, and Lake Mountain allotments; Big Ridge will be revisited by 2015 to determine trends in streambank stability, Grouse Creek will be revisited in 2013 to determine if changes to the AOI were successful in reducing woody alteration, and Lake Mountain will be revisited upon completion and implementation of NEPA for the allotment.

Table 5. Corrective Actions Taken and Follow-up Monitoring for 2013 BMPEP Report

Form	Project/Site	Implemented	Effective	Corrective Action Taken in 2012	Notes for 2013 Evaluations
T02	Tennessee Thin Unit 11A	Pass	Not Effective	Waterbars rebuild and crossing of swale repaired	Check condition of rebuild waterbars and swale crossing repair
E08	Mill-Luther Phase 3-18N31	Minor Departure	At Risk	None	Check for erosion of road surface and fillslope to determine if additional armoring is necessary
E09	Last Canyon 44N45A	Not Implemented	Not Effective	Road was resurfaced with gravel and slope armored with gravel	Check to see if resurfacing and armoring done in 2012 was effective in preventing erosion on road surface
E13	Mill-Luther Phase 3-18N32	Not Implemented	At Risk	None	Watershed and engineering will re-visit in 2013 to evaluate the risk failure at this crossing and determine if additional work is required
R22	Indian Creek River Access	Pass	At Risk	None. Drainage in parking area will be monitored to determine if gravel should be brought in	Monitor for erosion in parking area to determine if more gravel should be brought in
G24	Lake Mtn	Pass	Not Effective	No changes in grazing management. Area to be evaluated under NEPA in 2013. Recommend Fencing or placing a trough outside the meadow.	Monitor condition of meadow for BMP and NEPA analysis
G24	Grouse Creek	Minor Departure	At Risk	The permittee was called to remove cattle from the unit and the AOI for 2013 will be changed	Monitor woody alteration and streambank stability to see if management changes for 2013 are adequate

References

USDA, Forest Service, 2002, Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide, USDA, Forest Service, Pacific Southwest Region.

Appendix A. BMP Evaluation Procedure Names and Descriptions

Procedure #	*Procedure Name (BMPs Monitored)*
T01	Streamside Management Zones (BMP 1.8, 1.19, 1.22)
T02	Skid trails (BMP 1.10, 1.17)
T03	Suspended yarding (BMP 1.11)
T04	Landings (BMP 1.12, 1.16)
T05	Timber sale administration (BMP 1.13, 1.20, 1.25)
T06	Special erosion control and revegetation (BMP 1.14, 1.15)
T07	Meadow protection (BMP 1.18, 1.22, 5.3)
E08	Road surface, drainage and slope protection (BMP 2.2, 2.3, 2.4, 2.13)
E09	Stream crossings (BMP 2.8, 2.13)
E10	Road Decommissioning (BMP 2.7, 2.13)
E11	Control of side cast material (BMP 2.3, 2.4, 2.13)
E12	Servicing and refueling (BMP 2.5, 2.11)
E13	In-channel construction practices (BMP 2.3, 2.8, 2.13)
E14	Temporary roads (BMP 2.1, 2.7, 2.8)
E15	Rip rap composition (BMP 2.3, 2.8)
E16	Water source development (BMP 2.5)
E17	Snow removal (BMP 2.9)
E18	Pioneer road construction (BMP 2.3, 2.13)
E19	Restoration of borrow pits and quarries (BMP 2.3, 2.8, 2.12)
E20	Management of roads during wet periods (BMP 2.3, 2.4, 2.5, 2.9, 2.13)
R22	Developed recreation sites (BMP 4.3, 4, 5, 6,9, 10)
R23	Location of stock facilities in wilderness (BMP 4.11)
G24	Range management (BMP 8.1, 8.2, 8.3)
F25	Prescribed fire (BMP 6.3)

Appendix A Cont'd. BMP Evaluation Procedure Names and Descriptions

Procedure #	*Procedure Name (BMPs Monitored)*
M26	Mining operations (Locatable minerals) (BMP 3.1, 3.2)
M27	Common variety minerals (BMP 3.3)
V28	Vegetation manipulation (BMP 5.1, 5.2, 5.5, 5.7)
V29	Revegetation of surface disturbed areas (BMP 5.4)
R30	Dispersed Recreation Sites (BMP 4.5, 4.6, 4.10)

Appendix B. Documentation of Monitoring from Timber Sale Administrator's BMP – WWO Seasonal Report Tables.

Project (timber sale)	Feature evaluated	Date	BMP status	BMP problem	Fix	Comment/ Corrective action
Trolley Stewardship	Roads	2/13/2012	Not Met	Wet Snow	No haul on roads	
Trolley Stewardship	Roads	2/15/2012	Meet			New Snow, cold temps
Trolley Stewardship	Skid trails and roads	2/21/2012	Not Met	Thaw	No operations, no skidding	Rain, warm temps, melting snow and ice
Trolley Stewardship	Roads	2/29/2012	Meet			Contractors plowed snow
Trolley Stewardship	Skid trails	3/20/2012	Not Met	Thaw	Skidding terminated	Too wet
Trolley Stewardship	All operations	3/28/2012	Not Met	Thaw	All operations terminated	Too wet
Trolley Stewardship	All operations	4/2/2012	Meet			Equipment moved out
Larch	Skid trails and roads	11/21/2012	Not Met	Rain	Operations terminated	
Lookout	Skid trails, roads	1/12/2012	Meets			Ground is dry and frozen
Lookout	Skid trails and roads	11/21/2012	Not Met	Rain	Operations terminated	
Mt Hebron	Roads	1/27/2012	Not Met	Thaw	Haul Stopped	Rain and hi temps- haul stopped
Mt Hebron	All operations	1/31/2012	Not Met	Rain and snow	Operations terminated until spring	
Blacktail	Skid trails, roads	1/3/2012	Meets			Frozen ground, little moisture
Blacktail	Skid trails	1/19/2012	Meets			1/2" of snow, dry underneath
Blacktail	Roads	1/19/2012	Meets			Road is dry and frozen
Blacktail	Roads	1/26/2012	Not Met	Thaw	Haul Stopped	Rain and hi temps- haul stopped
Blacktail	Skid trails, roads	1/31/2012	Not Met	Rain and snow	Hauling and skidding stopped	
Little Grizzly Stewardship	Road	10/18/2012	Meets	Wet		No haul
Little Grizzly Stewardship	Road	10/22/2012	Meets	Wet		No operations
Little Grizzly Stewardship	Road	10/31/2012	Meets	Wet		No Haul or skid
Little Grizzly Stewardship	Skid trails, roads	11/12/2012	Meets	Wet		Suspended operations

Appendix C. Comparison of Evaluation Accomplishments with Target for KNF

Evaluations were accomplished for a total of 61 sites, using 22 protocols to assess timber, engineering, recreation, grazing, and minerals management. The Regional Office set the Klamath's target at 58 sites using 23 protocols.

Activity	KNF Targets	KNF Accomplishments
T01	4	4
T02	3	4
T03	2	2
T04	3	4
T05	2	2
T06	0	0
T07	1	1
E08	4	4
E09	4	4
E10	2	2
E11	4	4
E12	0	0
E13	2	4
E14	3	3
E15	0	0
E16	2	2
E17	3	3
E18	0	0
E19	0	0
E20	1	1
R22	2	2
R23	0	0
R30	2	2
G24	4	4
F25	5	5
M26	1	1
M27	1	1
V28	2	2
V29	1	0
Totals	58	61